

deposited in Lough Foyle about the beginning of the Christian era, the spot where the objects were sunk having since become dry land, owing to upheaval of the coast-line. The claim of the British Museum was, however, not sustained.

In connection with this contention, Messrs. George Coffey and R. Lloyd Praeger made special investigations into the evidence of recent geological changes, and these they have brought forward in an essay on "The Larne Raised Beach: a Contribution to the Neolithic History of the North of Ireland" (*Proc. R. Irish Acad.*, vol. xxv., December, 1904). To this essay we are indebted for the preceding statement. After dealing generally with the phenomena indicative of changes of level in Glacial and post-Glacial times, the authors treat particularly of the post-Glacial history, which began with a long period of emergence, and a land-level at least 30 feet higher than at present. The evidence obtained near Larne and Belfast tells of subsequent submergence, re-elevation (the amount of which increased northward), and of a final slight movement of submergence in recent times that has left the surface as we now find it. The raised beach of the Curran at Larne was accumulated over estuarine muds during the period of submergence, and it is of peculiar interest owing to the occurrence in it from top to base of worked flints of Neolithic type. A detailed account, with figures of the flints, is given. The evidence is taken to indicate that man was on the ground during the submergence that allowed of the continued laying down of 20 feet of gravels in shallow water or between tides. Moreover, the abundance of flint flakes in the surface-layers renders it probable that Neolithic man persisted after that movement of elevation had set in which made the top of the gravels a land-surface. Attention is directed to further evidence at Whitepark Bay, east of the Giant's Causeway, and again in the neighbourhood of Portstewart, which lies only 13 miles E.N.E. of Brougher. At Whitepark Bay, Neolithic "black layers" or land-surfaces occur at various levels among the sand-dunes, while near Portstewart old surfaces with Neolithic remains are found in deep wind-excavated hollows in the dunes. (see Fig. 1). This evidence proves conclusively that the ground on which the gold ornaments were found has been a land-surface, with an elevation at least as great as at present, since Neolithic times, the whole of the movement of elevation, which formed the post-Glacial raised beach of the north-east of Ireland, having been accomplished during Neolithic times.

### NOTES.

THE president of the Royal Society, and Lord Rayleigh, chairman of the general board of the National Physical Laboratory, have issued invitations to a visitation of the laboratory on Friday, March 17, when the various departments will be on view and apparatus will be exhibited.

THE thirteenth "James Forrest" lecture of the Institution of Civil Engineers will be delivered by Colonel R. E. B. Crompton on Monday, April 10, upon the subject of "Unsolved Problems in Electrical Engineering."

PROF. W. J. SOLLAS, F.R.S., has been elected a member of the Athenæum Club under the rule which empowers the annual election by the committee of nine persons "of distinguished eminence in science, literature, the arts, or for public services."

MR. J. E. S. MOORE has been appointed director of the Cancer Research, which is carried out in connection with the Royal Infirmary.

It is stated that the Madras Government has sanctioned the establishment of an experimental garden in Malabar for the investigation of pepper vine disease.

THE second annual dinner of old students of the Royal College of Science, Ireland, will be held on St. Patrick's Day, Friday, March 17, at the Holborn Restaurant, London.

PROF. K. MÖBIUS has retired from the directorship of the Berlin Museum of Natural History. The position has been offered to Prof. H. H. Schauinsland, director of the museum at Bremen.

SIR WILLIAM BROADBENT will preside at a medical conference on the teaching of hygiene and temperance, to be held at the Examination Hall, Victoria Embankment, on Friday, March 24.

THE *British Medical Journal* states that Prof. E. A. Minchin, F.R.S., has undertaken to conduct—on the spot—further investigations, under the auspices of the Royal Society's Committee, into the causation of sleeping sickness in the Uganda Protectorate.

THE fifteenth German Geographentag will be held at Danzig on June 13-15. The chief subjects of papers and discussions will be south polar exploration, vulcanology, coast morphology and formation of dunes, and school geography.

AFTER a pause of many years France has again entered the list of gold-producing countries. In December, 1904, the first gold mill in France was started at the La Lucette antimony mine, near Laval. A 10-stamp mill is running steadily, the daily production amounting to about 1 kilogram of gold in the form of a rich concentrate.

We learn from the *Chemist and Druggist* that two prizes, one of 5000 francs (200*l.*) and the other of 3000 francs (120*l.*), have been offered by Dr. Henri de Rothschild to the Scientific Society of Alimentary Hygiene, Paris, for the best treatises written in French on the rational food for man. The prizes will be awarded in 1906, and the papers must be sent in by December 31, 1905.

THE experiments with wireless telegraphy between Diamond Island and the Andamans are, says the *Pioneer Mail*, giving most satisfactory results. A recent message transmitted from Port Blair reached Calcutta in nineteen minutes, though it had to come over the land-lines after being received at Diamond Island.

THE Paris correspondent of the *Times* reports that a telegram has been received from M. Jean Charcot, the explorer in command of the French Antarctic expedition, dated Puerto Madryn, March 4. It is stated that scientific work was carried on under good conditions while wintering on Wandel Island. Several parts of Graham Land hitherto unknown have been explored, and by following the coast continuously its outline has been determined.

THE *Times* states that the French Ministry of Public Works has commissioned M. Jacquier to project plans for a railway between Chamonix and Aosta. It is considered that the difficulty would not be so great as with the Simplon tunnel; the tunnel would be  $4\frac{1}{2}$  miles shorter, and the rock gives no indication of subterranean reservoirs of water. The tunnel would commence at Chamonix, 3415 feet above sea level, and end at Entrèves (4550 feet), a distance of  $8\frac{1}{2}$  miles. The Dora Baltea would give ample water power for the boring work, and afterwards for locomotion.

THE preliminary programme has been issued for the International Congress of Botany to be held at Vienna in Whitsun week, June 11-18. The formal opening of the congress will take place on Monday, June 12, in the large hall of the University of Vienna. A conference on the nomenclature question will be opened on the same day, and will be continued on other days. The chief subject of papers on June 13 will be the development of the European flora since the Tertiary period. On June 14 a general meeting of the botanical societies assembled for the conference will be held, as well as a conference of agricultural botanists. The subjects of discussion for the scientific meetings on June 14 will be (1) the present condition of the theory of the assimilation of carbonic acid, and (2) regeneration. Among the papers to be read on Friday, June 16, may be mentioned one by Dr. D. H. Scott, F.R.S., on the fern-like seed-plants of the Carboniferous flora. The organising committee has arranged for excursions before, during, and after the congress, and these will afford visitors an opportunity of learning to know botanically interesting regions under the guidance of specialists. In connection with the conference, too, an international botanical exhibition has been arranged, and will take place in the orangery of the Imperial Chateau at Schönbrunn. Full particulars of the conference can be obtained by intending visitors on application to the general secretary, Dr. A. Zahlbruckner, I., Burgring, Vienna.

A SHORT time ago we chronicled the death of Prof. Emilio Villari, of Naples. Some interesting biographical details relating to this well-known physicist have now been published by Prof. A. Ròiti in the *Memorie* of the Italian Spectroscopists' Society (Catania, December, 1904) and the *Atti* of the Lincei Academy, xiv. (i), 1. As in the case of the late Prof. G. F. Fitzgerald, there can be no doubt that Villari's death was largely due to overwork, a result in both instances brought about by the great amount of teaching work which these physicists were required to undertake in their professorial duties, and which, when combined with research work, left them no time for rest. From his birth, in 1836, Villari suffered from epilepsy, and, partly in consequence of this, his early education was obtained at private schools. He graduated in medicine at Pisa. In 1860 he taught in the medical school of Naples; the next year he returned to Pisa as professor of physics and chemistry; in 1864 he studied in the laboratory of Magnus at Berlin. From 1865 to 1871 he occupied chairs at Florence; he was then, by competition, appointed to the chair at Bologna, which he held until 1889, when he went to Naples. His duties at the latter place involved the conducting of three separate University courses of lectures, and it is not surprising that in the session 1902-3 he broke down under the stress of work, and after a long and painful illness died on August 20 of last year. In the forty years from 1865 to 1904, Villari produced a long series of papers, which might advantageously be collected and published in a volume. His most recent work refers to the properties of air and gases which have been rendered radio-active by Röntgen rays, and to which he gave the name "aria ixata," or, literally, "X'd air." He was an honorary member of our Royal Institution and the Physical Society of London, and for some time previous to his death was president of the Lincei Academy.

THE usual prize announcements of the Royal Lombardy Institution are given in the *Rendiconti*, xxxviii., 1. The triennial gold medal for industry is awarded to Messrs. Vermot and Rejna for carriage springs and axles. The Cagnola prizes for velocity of kathode rays, steering of balloons and prevention of forgery, as well as several other prizes, remain unawarded, while for cure of pellagra a

premium is awarded to Dr. Carlo Ceni, of Reggio (Emilia), and for miasma and contagion the full prize and a gold medal are conferred on Dr. Adelchi Negri, of Pavia. As usual, there is keen competition for the Brambilla industrial prize, and the institution has awarded three first prizes with gold medals and four second prizes with gold medals to Lombardy manufacturers. Under the Fossati foundation an award is made to Dr. Giuseppe Pagano for a thesis on cerebral localisation. The Kramer prize for an essay on electric traction is awarded to Giovanni Giorgi, engineer, of Rome, and three awards under the Ciani prize are given for books on modern Italy.

THE following list of prize subjects now issued by the Lombardy Institution for 1905 and following years includes the announcements made last year. Institution prizes, for 1905, on the ophiolitic formations of the Apennines; for 1906, on modern psychiatry. Cagnola prizes, for 1905, on phenomena of catalysis; for 1906, on pathology of supranal capsules. Fossati prizes (open to Italian subjects), for 1905, on our present knowledge of neurology; for 1906, on visual centres of higher vertebrates; for 1907, on nuclei of cranial nerves; for 1908, on the central nervous system. Kramer prize, for 1905, on the resistance of cement structures. Secco Comneno prize for a discovery on the virus of rabies. In addition, the triennial medals, Cagnola, Brambilla, Pizzamiglio, Tommasoni, Zanetti, and Ciani prizes are offered under the usual conditions, which have been referred to in previous years in the columns of NATURE.

IN the West India Committee *Circular*, Mr. Kenrick Gibbons suggests that mosquitoes are largely destroyed in Barbadoes by swarms of small fish, locally known as "millions," which prey on the larvæ.

IN the February number of the *Zoologist* Mr. E. Bergroth, of Tammerfors, Finland, gives a list of generic zoological names not included in the supplement to the "Index Zoologicus" compiled by Mr. C. O. Waterhouse and published in 1902. While the number of names in the latter is about 250, no less than about 300 are recorded by Mr. Bergroth, all dating before 1901.

SOME months ago Schaudinn published some interesting observations on the development of trypanosome forms from *Halteridium*, a protozoan blood parasite of birds. Novy and MacNeal now criticise Schaudinn's work, and ascribe his results to a double infection with *Trypanosoma* and *Halteridium*, and not to the development of the former from the latter.

WE have received the *Transactions* of the Epidemiological Society for the session 1903-4 (vol. xxiii.). It contains a paper by Prof. Simpson on the epidemiology of plague, in which he shows that the domestic animals and birds may contract plague by feeding on plague-infected offal, and important discussions on sleeping sickness, the etiology of scurvy, industrial anthrax, and enteric fever and cholera in Hamburg, together with an obituary notice of the late Sir John Simon.

SOME interesting notes on the habits of Natterer's bat (*Myotis nattereri*) are contributed by Mr. T. A. Coward to the *Zoologist* for February. From these it appears that in certain habits this bat is to some extent intermediate between other members of the Vespertilionidæ and the horse-shoe bats (Rhinolophidæ). It has, for instance, the habit of turning in the air, characteristic of the latter. Again, whereas in the horseshoe-bats the short tail is carried bent over the back, while in most British Vespertilionidæ this



appendage is usually carried beneath the body, in Natterer's bat, despite the fact of its being used as a pouch to contain the insect-food, it is borne extended in the line of the body.

To the complex subject of nuclear changes is devoted the greater portion of the February issue of the *Quarterly Journal of Microscopical Science*, Messrs. Farmer and Moore discussing the "maiotic" phase (reduction divisions) in animals and plants in the first article, while in the second Prof. Farmer and Miss Shove describe the structure and development of the somatic and heterotype chromosomes of *Tradescantia*. The term "maiotic" phase is a new one, proposed to cover the whole series of changes formerly known as heterotype and homotype; as being derived from *μελαισις* (reduction) its orthography should apparently be "miotic." Of the other two articles, one, by Messrs. Moore and Robinson, describes the behaviour of the nucleolus in the spermatogenesis of *Periplaneta*, while the other, by Mr. G. Wagner, is devoted to certain movements and reactions of *Hydra*.

FROM a letter which Mr. P. Olsson-Seffer has written to *Science*, we learn that a Danish botanist, Mr. M. P. Porsild, has sought the help of his Government in founding an Arctic laboratory, which it is proposed to establish near Godhavn (lat. 69° 15' N.), on Disko Island, North Greenland. Such a laboratory would be the first institution of its kind for investigating Arctic problems, and would form a counterpart in the cold regions to the tropical stations at Buitenzorg and Ceylon. The power of plants to withstand intense cold, and their nutrition under the peculiar conditions of light, will probably be among the earliest researches.

MR. J. H. MAIDEN has contributed to the *Proceedings of the Linnean Society of New South Wales* (August, 1904) an account of the plants collected by Mrs. David on Funafuti, one of the Ellice group of coral islands. The list agrees very closely with those of collections made on similar islands, notably Samoa, Fiji and Keeling Islands, and consists of fifty flowering plants representing thirty-three orders. The native names are very similar to the Samoan. Although the plants include various edible products, such as the almonds of *Terminalia Catappa*, the sword-bean, and fruits of *Pandanus*, the islanders subsist chiefly on taro and bananas.

THE second part of Prof. E. C. Jeffery's treatise on the comparative anatomy and phylogeny of the Coniferales claims attention not only for the facts which he has observed in examining various genera of the Abietineæ, but more especially on account of the deductions which, evolved from the consideration of certain formulated canons of comparative anatomy, by their evident consistency go far to establish the validity of these canons. It is possible to trace in the Abietineæ a sequence from forms such as *Tsuga* and *Cedrus*, in which resin-canals are absent from the wood of all normal stem parts, through certain species of *Abies*, in which the resin-canals occur only in the wood of the reproductive axis, to *Picea*, *Larix*, and *Pinus*, where they are formed normally in the wood of the vegetative axis. Among the former, resin-canals are freely produced in the vegetative shoots as a result of injury. From these and other facts Prof. Jeffery concludes that the Abietineæ are a very ancient order, older than the Cupressineæ, and by the possession of a double leaf-trace are allied to the Cordaitales. The treatise forms the first number of vol. vi. of the *Memoirs of the Boston Society of Natural History*.

WE have received the report of the Meteorological Commission of Cape Colony for the year 1903. A comparison of the number of ordinary stations shows a fair increase over

that for 1902, except in the case of purely rainfall stations, where there is a decrease of 31. This is partly due to the fact that owing to severe drought many farmers have had to trek with the remains of their cattle to adjoining territories, leaving their homesteads entirely unoccupied. The report contains useful monthly and yearly average rainfall data, for districts, over Cape Colony for the ten-year period 1894-1903.

PROF. H. HERGESELL, president of the International Aeronautical Committee, has favoured us with a summary of the monthly ascents made during the last six months of the year 1904 for the exploration of the upper air by means of manned and unmanned balloons and kites. The average number of ascents per month was eighteen, and some remarkable altitudes were attained by the unmanned balloons, seven of them exceeding 15,000 metres, and eighteen exceeding 10,000 metres, the extremes being 24,970 metres, at Strassburg, and 19,750 metres, at Pavlovsk, both in the month of September. Special mention may be made of some important kite ascents from the yacht of the Prince of Monaco last autumn, during which a height of 4510 metres was attained to the north-west of the Canary Islands, and 4360 metres south of the Azores. We hope shortly to refer to some valuable results obtained from the discussion of these observations in the region of the trade winds.

WE have received a copy of the fifth edition of Jelinek's excellent "Instructions for taking Meteorological Observations," issued under the superintendence of Dr. J. M. Pernter, the present able director of the Austrian Meteorological Service. The first two editions (1869 and 1876) were written by Dr. Jelinek, the third and fourth (1884 and 1893) were revised by Dr. J. Hann, who is justly recognised as the foremost of living meteorologists. Not forgetting the excellent meteorological instructions issued in Russia by the late Dr. H. Wild, in France by M. Angot, and in Germany by Dr. van Bebber, nor the useful handbooks of smaller pretensions by Dr. Scott (late of the Meteorological Office) and Mr. Marriott (Royal Meteorological Society), we can have no hesitation in asserting that the work now under notice is second to none among works of a similar kind. It is thoroughly up-to-date, and contains all that is necessary to be known in connection with the recent considerable advances made by the introduction and more general use of various self-recording instruments, and with the more systematic observations of clouds. It contains good representations of eight of the principal forms of clouds, reproduced from the International Cloud Atlas, and 37 other illustrations, with sound advice in the choice of necessary instruments and the establishment of stations of all classes, whether first-order observatories or stations intended to record merely rainfall and temperature. Any observers in our own country who may be conversant with the German language would, we think, be much interested by a careful perusal of this very instructive work.

THE current number of the *Fortnightly Review* contains an article by M. A. Santos-Dumont on "The Future of Air-Ships." The difficulties against which the navigator of the air has to contend are explained, and the means adopted by various aeronauts to overcome these obstacles are described. The two great obstacles to ballooning, M. Santos-Dumont points out, are contraction and expansion. To counteract contraction ballast must be thrown out, to compensate for expansion, gas must be allowed to escape. The skill of the aeronaut of a spherical balloon consists in maintaining his desired altitude with the greatest economy of gas and ballast. But in any case repeated contractions

must mean the loss of the last lot of ballast, and repeated expansions must result in the loss of so much gas that the balloon sinks eventually to earth. The latest plan proposed to overcome this weakness is described at length in the article. Steam circulating in a long aluminium worm will be used to heat the gas of the balloon, and contraction will mean merely the condensation of so much steam into water, while expansion will be brought about by its reconversion into steam. The difficulty consists in preventing any loss of water, and M. Santos-Dumont explains how he proposes to effect this. The successful use, at an early date, of air-ships in Arctic exploration is predicted, and the part that air-ships will take in the warfare of the future is outlined.

We have received from Messrs. A. Gallenkamp and Co. specimens of some new spectrum tubes which we have tested with very satisfactory results. The tubes, three in number, contained argon, helium, and a mixture of argon and helium, and the trial showed that they are a great advance on any other forms that have previously been examined. For spectroscopic work they should be of the greatest service, for the exceeding brilliancy of the gases, when only a small coil, with or without a jar in circuit, is used, will render them particularly useful in research work. The tubes themselves are of rather novel construction, the main point being the insertion of a short capillary tube in a tube of larger dimensions, the latter being connected with two other tubes fixed at right angles, and containing the electrodes. The current passing from one electrode to the other has to pass through the capillary, and the gas in this space is rendered very brilliant. When placed end on to the slit of a spectroscope, the bulb end of the tube containing the capillary being on the slit side, a method first adopted by Monkhoven to obtain the maximum of brilliancy of the illuminated gas on the slit, the result is a brilliant concentration of light which can be examined with large dispersion. The tubes are strong, compact, and well made, and can be strongly recommended both for student and research use.

PROF. A. H. R. BULLER, writing from the University of Manitoba, describes some striking electrical effects due to the dryness of the atmosphere at Winnipeg. The air during the winter months contains so little water-vapour that bodies charged with electricity lose their charges relatively slowly. When the thermometer is low, ranging as it often does for a week or more at a time from  $0^{\circ}$  to  $-40^{\circ}$  F., very little friction, such, for instance, as may be produced by walking along a carpet, causes a person to become charged with sufficient electricity to produce a visible and audible spark on touching an iron bedpost, the radiator, the gas-tap, or any other conductor. It is a favourite amusement of some children to take sparks from each other's noses after running about a carpeted room. In the Manitoba Hotel, now burnt down, there was a ball-room with some iron pillars in it. Prof. Buller was told by a trustworthy eye-witness that after a dance dancers on several occasions have been "severely stung" by accidentally coming into contact with one of the pillars. Many ladies have considerable difficulty in combing their hair; for during the process it becomes so charged with electricity that it stands out in the most astonishing manner. Even the short hair of a man, when being combed, often "crackles," "stands on end," and in the dark produces a display of sparks. It is quite easy to light the gas with a spark from the finger when matches are not handy by merely shuffling a few paces over the carpet and then holding a finger to the burner. On February 6, at 1 p.m., when a

thermometer in the shade out of doors registered  $-5^{\circ}$  F. and indoors  $72^{\circ}$  F., Prof. Buller found that a spark half an inch long could be obtained between his finger and an earth-connected iron pipe after sliding his feet smartly for twenty paces along the maple-wood floor of his laboratory. In the chemical laboratory calcium chloride may be exposed to the air for some weeks without showing the least apparent signs of deliquescence. In order to demonstrate the deliquescence of this substance to the students, the professor of chemistry is obliged to use a damp-chamber.

No. 2 of vol. ii. of *Le Radium* contains an account by M. J. Danne of the deposits of pyromorphite containing radium which have recently been discovered at Issy-l'Évêque (Saône et Loire), and the first part of a study of phosphorescence by M. L. Matout. A description is also given by Dr. Robert Abbe, of St. Luke's Hospital, New York, of several cures of external tumours and cancerous growths which were effected by means of radium.

AN investigation of the effect of temperature on the magnetisation of steel, nickel and cobalt by Prof. H. Nagaoka and S. Kusakabe constitutes article 9 of vol. xix. of the *Journal of Science of the University of Tokio*. The most interesting results were obtained with cobalt and with tungsten-steel. The former is characterised by undergoing several remarkable changes of magnetisation as the temperature is raised, whilst with tungsten-steel, between the temperature of disappearance of magnetism on heating and that of its reappearance on cooling, there exist at least five corrugations in the curve of magnetisation in a constant field. When once the magnetisation has disappeared it cannot be recovered until the temperature has been lowered by about  $240^{\circ}$  C., and the cooling curve again exhibits peculiar sinuosities. In addition to these peculiarities, tungsten-steel shows a very pronounced recalcence at  $660^{\circ}$  C., this temperature practically coinciding with that at which magnetism reappears in the cooling metal.

IN No. 3 of vol. vi. of the *Physikalische Zeitschrift* Messrs. Elster and Geitel describe further investigations of the highly radio-active muds from the thermal springs of Nauheim and Baden. These sediments are completely soluble in hydrochloric acid, and on adding dilute sulphuric acid to the solution, a precipitate of radio-barium sulphate is obtained having an activity many times as great as that of an equal quantity of the original mud. The oxides precipitated by ammonia from the filtrate of the barium sulphate are also radio-active, the character of the emanation indicating the presence of thorium, although this substance could not be separated by chemical methods. Prof. G. Vicentini and M. Levi de Zara, in the *Atti* of the Royal Venetian Institute (vol. lxiv., ii., 95), also deal with the question of radio-active sediments. The radio-activity of the mud and of the incrustation formed by the thermal springs of Battaglia, Abano, Montegrotto and the Lake of Lospida has been measured. The Cittadella spring at Montegrotto is particularly noteworthy on account of the high value of its radio-activity and of the fact that this appears to be due to radium only. The air in the vicinity of the springs was in all cases found to contain notable quantities of a radio-active emanation.

THE latest addition to the Philosophische Bibliothek published by the Dürsch'schen Buchhandlung, Leipzig, is a translation of Spinoza's "Ethics," with an introduction and notes, by Dr. Otto Baensch. The volume is No. 92 of the series of philosophical manuals in which it is published, and its price is three marks.



WE have received from Mr. A. C. Cossor, of Farringdon-road, E.C., an illustrated catalogue of Röntgen ray tubes, electrical instruments and fittings, and small electric lamps for all purposes. The catalogue should be of interest to physicists, medical men and others interested in high vacuum work.

THE fourth part of the second volume of "The Fauna and Geography of the Maldive and Laccadive Archipelagoes: being the Account of the Work carried on and of the Collections made by an Expedition during the years 1899 and 1900," edited by Mr. J. Stanley Gardiner, has been published by the Cambridge University Press. This part contains reports on the Alcyonaria of the Maldives by Prof. S. J. Hickson, F.R.S.; on marine crustaceans by Major Alcock, F.R.S., and Prof. H. Coutière; on hydroids by Mr. L. A. Borradaile; on Rhynchota by Mr. W. L. Distant; and notes on parasites by Mr. A. E. Shipley, F.R.S.

MESSRS. TEUBNER, of Leipzig, have just issued a fifth edition of Schlömilch's "Uebungsbuch zum Studium der höheren Analysis," part i., of which the first edition appeared in 1868, and a second edition of Dr. A. Föppl's "Einführung in die Maxwell'sche Theorie der Elektrizität," the first edition of which appeared in 1894. Of these, the former, which in England would be called a "treatise on the calculus," has been revised by Prof. E. Naetsch, of Dresden, and several new paragraphs on transformation of coordinates have been added. The work of editing Dr. Föppl's treatise has been undertaken by Dr. M. Abraham, who is preparing a second volume dealing with "theory of electromagnetic radiations."

### OUR ASTRONOMICAL COLUMN.

JUPITER'S SEVENTH SATELLITE.—Circular 74 from the Kiel Centralstelle confirms the telegram received last week concerning the discovery of a seventh satellite to Jupiter.

It contains a message from Prof. Campbell in which he states that the object was discovered by Prof. Perrine, using the Crossley reflector. The position previously given, viz. position angle =  $62^\circ$ , distance from Jupiter  $21'$ , was that occupied by the satellite on February 25.6 (G.M.T.). The apparent motion was direct, and the orbit is considerably inclined to the ecliptic. This latest satellite has been under observation, with the Crossley reflector, since January 2, but no particulars of the observations, other than those for January 25, are given in the circular.

LONGITUDE OBSERVATIONS OF POINTS ON MARS.—Bulletin No. 14 from the Lowell Observatory contains the results of the longitude determinations of nearly sixty features on the surface of Mars made at Flagstaff during 1903. For each point the times of the several observations and the resulting longitudes are given, and these are followed by the mean value for the longitude and its probable error; the mean value for the latitude of each point is also given.

The longitudes were determined by noting the time of transit of each marking across the micrometer thread when the latter was placed parallel to the position angle of the polar axis, as given in Mr. Crommelin's ephemeris, and passing through the polar cap. As the thread obliterated the markings it became easier in practice to record the time at which the marking and the cap were equidistant from the thread.

Mr. Lowell has allotted a number to the result of each determination showing the relative weight to be attached to the value obtained.

OBSERVATIONS OF COMETS.—The comets 1904 *e* (Borrelly), 1904 *d* (Giacobini), and 1904 *a* (Brooks) have been regularly observed, at Lick, by Dr. R. G. Aitken, and the results are published in No. 69 of the Lick Observatory *Bulletins*.

Observations of comet 1904 *e* were made during the end of December and the beginning of January, and two sets of parabolic elements were computed from the results. Subsequent observations did not confirm these, and consequently Dr. Aitken computed elliptic elements from his

observations of December 31, 1904, January 17 and 27, 1905. When the observational values were compared with the places calculated from these elements, the agreement was found to be satisfactory, and it seems probable that the comet is moving in an elliptical orbit with a period of about 7.3 years. An ephemeris based upon these elements and extending to March 31 is given, and shows that on March 11 the comet will be only 0.27 as bright as at the time of discovery, when it was variously estimated as being of the tenth or eleventh magnitude.

Comet 1904 *d* was observed on January 28, and the observation showed that the orbit published in *Bulletin* No. 67 needs very little correction. From the comet's appearance on that date it is evident that this object will soon be beyond the reach of all but the most powerful telescopes. An ephemeris extending to April 3 is given.

Observations of comet 1904 *a* were made with the 12-inch refractor by Messrs. Maddrill and Aitken during the period June 21–September 4, 1904, and the results are given in the same circular. A footnote by Dr. Aitken states that the comet was still visible in the 12-inch telescope on January 26, and an observation made on that date showed that Prof. Nijland's ephemeris is very nearly exact.

THE GOVERNMENT OBSERVATORY AT VICTORIA.—We have received the annual reports of the board of visitors and the director of the Victoria (Australia) Observatory for the years ending March 31, 1903, and 1904.

The reports show that the routine work connected with the meridian observations, the time service, the meteorological, magnetic, and seismological observations, and instrument testing was carried out as usual.

On the later date the taking of the catalogue plates for the astrophotographic chart, to the number of 1149, had been completed, whilst satisfactory progress had also been made with the other sections of the work. The measurement of both the Sydney and the Melbourne plates is being carried out at Melbourne, and on March 31, 1904, 239 Sydney plates containing 137,812 stars, and 522 Melbourne plates containing 151,343 stars, had been completely measured. A new measuring machine designed by Mr. H. C. Russell was finished, and its fitness was being investigated when the report was issued.

The director, Mr. P. Baracchi, states that the work of measuring the magnetograph curves and reducing all the magnetic observations made since 1868 is progressing satisfactorily, and that he hopes the results will be published within the next two or three years.

OBSERVATIONS OF SATURN'S SATELLITES.—The results of a series of observations of the relative positions of the seven inner satellites of Saturn are published in *Bulletin* No. 68 of the Lick Observatory. The observations were made by Prof. Hussey with the 36-inch refractor between August 3 and December 2, 1904, and in each case the position angle and distance of the satellite in regard to one of the other satellites are given.

BRIGHT METEORS.—Mr. R. L. Jones, writing from 3 King's Bench Walk, Temple, E.C., refers to three bright meteors observed on the nights of February 27 and 28. All the three appear to have started from the constellation Monoceros, and to have tracked thence in a north-westerly direction. A brilliant meteor was also seen at 12.10 a.m. on March 1, its brightness far exceeding that of Venus.

### THE MAGNETIC SURVEY OF THE UNITED STATES.

THE report for the year ending June 30, 1904, on the magnetic survey of the United States and its outlying territories has lately been issued by the authorities of the Coast and Geodetic Survey, and contains a long list of field observations of the magnetic elements made with the usual completeness, supported by results obtained in five fixed observatories. Two of the latter are at Porto Rico and Honolulu respectively.

The new feature in the present report is that the survey has been extended to the neighbouring seas both on the Atlantic and Pacific sides of North America, and it records the successful observation at sea of thirty-four values of